REMARKS

Reconsideration of the application is respectfully requested.

I. Status of the Claims

The listing of claims is presented as a courtesy to the Examiner.

Claim 7 was previously cancelled without prejudice or disclaimer of the subject matter therein.

Claims 1-6 and 8-10 are currently pending and stand rejected.

II. Rejection under 35 U.S.C. §103(a) (Obviousness)

Claims 1-5 and 8-10 are rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,077,059 to Hosono ("Hosono '059") in view of U.S. Patent No. 5,030,072 to Wenker, "Wenker". Claim 6 is rejected under 35 U.S.C. § 103(a) as being obvious over Hosono '059 in view of Wenker and further in view of U.S. Patent No. 5,813,844 to Hosono ("Hosono '844"). Applicants respectfully traverse the rejections.

In the present invention, the clearance between the external teeth and the internal teeth engaging therewith at a partition of the adjacent cells increases gradually as the cell volume increases from minimum to maximum. As a result, the rotation of the rotors is stabilized and noise is reduced.

The Examiner states that, regarding claims 1 and 3, Hosono '059 discloses an oil pump rotor assembly comprising an inner rotor having external teeth and an outer rotor with internal teeth, and the rotors being mutually engageable thereby. The Examiner acknowledges that Hosono '059 fails to disclose a clearance defined between the external and internal teeth.

The Examiner further contends that Wenker teaches the use of clearances between such teeth, and also discloses increasing and decreasing clearances between the teeth, as cell size changes.

The Examiner's statement seems to be based on the table in column 8, lines 27 to 34 of Wenker, which shows actual gap (clearance) dimensions (this table hereinafter referred to as "Table A"). Applicants respectfully disagree.

In Table A, dimensions of some gaps meet some of the conditions recited in claim 1 of the present invention. However, Table A is merely a first step in the CAD (computer-aided design) procedure, and represented only an incomplete first-draft design. Table A is followed by a series of revisions of the CAD parameters to fulfill the objectives of the Wenker invention. In the course of the subsequent revisions, the only dimensions shown and considered are SPC (gap No. 4, FIG. 3 of Wenker) and DPC (gap Nos. 4 and 5, FIG. 4, Wenker). Thus, in Wenker, the final dimensions of gaps other than SPC and DPC are unclear.

Further, in the section cited below (col. 5, line 66 to col. 6, line 12), Wenker discloses that gaps other than SPC and DPC can be arbitrarily set. As a result, Wenker fails to disclose dimensions of gaps other than SPC and DPC:

> As mentioned in the background of the disclosure, it is an object of [Wenker] to provide a gerotor design having a constant radial clearance. As will be apparent from the subsequent numerical example of the invention, the term "constant" in reference to the radial clearance between the ring lobes and star profile does not refer to gaps No. 1, 2, 3, 6 and 7, which, as explained previously, are not sealing points. Instead, the term "constant" as used herein in reference to radial clearance refers **only** to the single point clearance SPC and the double point clearance DPC. In other words, if the single and double point clearances SPC and DPC are equal, the gerotor gear set may be said to have a "constant radial clearance." (emphasis added)

In contrast, claim 1 of the present invention recites "the volumes of the cells increase along a rotational direction of the inner rotor and the outer rotor." Claim 3 also recites "the volume of the cells increase and decrease along a rotational direction of the inner rotor and the outer rotor."

Wenker fails to disclose this and other features of claims 1 and 3. Further, Wenker ignores the relative dimensions of gaps along the rotation (gaps other than SPC and DPC) and thus teaches away from claims 1 and 3 of the present invention.

A person of ordinary skill in the art would not know to correlate tooth clearance with the increase of volume of a cell, as the present invention discloses. Further, claims 1 and 3 of the present invention include features, mentioned *supra*, which were not disclosed in Hosono '059 or in

Wenker. Thus, claims 1 and 3 are allowable. Claims 2, 4, 5, 6, 8, 9, and 10 which depend from claims 1 or 3 are, thus, also allowable.

With regard to claim 8 of the present invention and the oil pump rotor assembly recited therein, the inner rotor and the outer rotor are formed such that the following equations and inequalities are satisfied:

(A) $\Phi bi=n\bullet(\Phi Di+\Phi di)$;

(B) $\Phi bo=(n+1)\bullet(\Phi Do+\Phi do)$;

(C) one of $\Phi Di+\Phi di=2e$ and $\Phi Do+\Phi do=2e$;

(D) $\Phi Do > \Phi Di$;

(E) $\Phi di > \Phi do$; and

(F) $(\Phi Di+\Phi di) < (\Phi Do+\Phi do)$.

Advantageous effects of the foregoing, specifically features (C) and (F) as above, are disclosed in the original Specification of the present invention at page 10, lines 7-13:

> Furthermore, in this invention, in order to make the inner rotor smoothly rotate in the outer rotor while ensuring tip clearance and a appropriate size of backlash, and reducing an engagement resistance, the diameter of the base circle of the outer rotor is made greater than that in a conventional case so that the base circle of the inner rotor does not contact the base circle of the outer rotor at the engagement

region at which the inner rotor engages the outer rotor, i.e., the following inequality is satisfied: $(n+1) \cdot øbi < n \cdot øbo$. Accordingly, the following inequality is derived: $(øDi+ødi) < (øDo+ødo)$.

Hosono '059, col. 3, line 53, however, discloses the following equation:

G) $(\Phi Di + \Phi di) = (\Phi Do + \Phi do) = 2e$.

This equation G) of Hosono '059 is inconsistent with feature F) of claim 8 of the present invention, listed on the previous page.

A person of ordinary skill in the art would not know to disclose the feature "the base circle of the inner rotor does not contact the base circle of the outer rotor at the engagement region at which the inner rotor engages the outer rotor," as is disclosed in the present invention. This feature, which yields specific technical advantages, is not disclosed, taught, or suggested in the prior art cited by the Examiner, thus, for at least this reason, claim 8 of the present invention should be allowable, in addition to the fact that the current claim 8 depends from allowable claim 1.

Furthermore, Hosono '844 does not cure the defects in either Hosono '059 or Wenker. Thus, Hosono '059, Wenker, and/or Hosono '844, either alone or in combination, do not teach or suggest to one of ordinary skill in the art all of the elements of the currently claimed invention. Applicants respectfully request the rejection be withdrawn.

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

The Examiner is respectfully requested to contact the undersigned at the telephone number indicated below if the Examiner believes any issue can be resolved through either a Supplemental Response or an Examiner's Amendment.

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Respectfully submitted,

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